TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (FACE) Program

SUBJECT: Two Well Drillers Electrocuted when Their Truck-Mounted Boom Contacts Overhead Power Lines in California

SUMMARY
California FACE Report #96CA006

A 25-year-old male well driller, the foreman (victim #1), and a 47-year-old male well driller, the foreman's assistant (victim #2), were electrocuted when their truck-mounted boom made contact with an overhead power line. The line was carrying 6900 volts in one phase of a 12,000 volt (12 Kv) three phase distribution system. It is believed that victim #1 was operating the controls of the boom and that victim #2 was near the truck retrieving tools from a side-mounted toolbox at the time of the incident. Their job had been to use a truck-mounted boom to pull a water well pump from the bottom of a well (approximately 400 feet deep) so that it could be inspected. The water well company had been hired by a financial service company to do the job. The employer stated that his company had done prior work at this location, and that both victims had performed this type of work on numerous occasions. The victims were discovered when neighbors noticed a brush fire and called the fire department. Fire department paramedics arrived first on the scene and were unable to detect any vital signs (pulse or spontaneous respirations) in either victim. The CA/FACE investigator concluded that in order to prevent future similar occurrences employers should:

· perform a hazard evaluation at each work site before any work is initiated.

· always contact the local power company when working in close proximity to energized high voltage power lines.

· train employees in the recognition of hazards, and methods to control such hazards.

· assure the "10-foot" rule is observed when working in close proximity to energized high voltage power lines.

INTRODUCTION

On April 8, 1996, victim #1 and victim #2 were electrocuted when their truck-mounted boom made contact with one phase of a 12 Kv three phase distribution system owned by an electric power company. The CA/FACE investigator was notified of this incident by a California Division of Occupational Safety and Health (Cal/OSHA) district office on April 9, 1996. A site investigation and employer interview took place on April 11, 1996. Photographs of the incident site were also taken at that time by the CA/FACE investigator. Copies of the coroner's autopsy report, police report, paramedic's report and Cal/OSHA report were obtained by the CA/FACE investigator.

The employer in this incident has been inspecting and maintaining water well pumps and other related equipment since 1985. There were only two workers employed by the company. One of these workers (victim #1) was also the safety officer, spending approximately 25% of his time in safety issues. Victim #1 had worked for his employer for approximately 2 years and victim #2 had worked with the company for approximately 7 months. The victims were required by their employer to wear work boots, hardhats and long pants. The employer stated that the victims had on-the-job safety training and that they had attended safety seminars given by the manufacturers of the pump products. A daily meeting was held to discuss the day's work and relevant safety issues. Both victims were described by the employer as experienced pump workers. The employer was the only individual within the company who was licensed in well pump installation.

INVESTIGATION

On the day of the incident, at approximately 9:30 a.m., victim #1 and victim #2 were in the process of setting up their equipment to retrieve the well pump for inspection. A financial services company had hired the company to do the work at this location. Most of the population in this rural area had private wells on their property. The employer stated that the house at this site had recently gone through a foreclosure and that it was therefore necessary to have the pump inspected prior to placing the house on the market. The victims were to retrieve the pump and bring it back to the company office. The employer would then inspect the pump and decide whether it needed maintenance, or a new pump should be installed. The employer had a previous work order from the incident site, but the victims had not done any previous work themselves. The work order did not mention electric power lines located directly above the well. The employer stated that on prior occasions when electrical lines were in close proximity to a work area, the electric power company was contacted and the electricity turned off until the job was completed.

The well pump was located at a depth of approximately 400 feet underground. It was to be brought up by the victims with the aid of a hoist. The employer stated that victim #1 was using their largest boom for this job. This boom is 31' 6" when fully retracted. The victim apparently chose the largest boom to pull the well piping up in 21 foot increments. Smaller booms on other trucks could not pull the piping up in such increments and would therefore lengthen the amount of time necessary to do the job. After each section of piping was brought up it would be secured and more piping would be brought up in the same manner.

At the time of the incident, it is believed that victim #1 was at the controls of the boom.

A sign was located near the controls of the boom which read "Look up for Wires". The controls were located at the rear of the truck (see Exhibit 1). Victim #2 was working adjacent to the truck near the tool box. Victim #1 raised the boom and made contact with one phase (6.9 Kv to ground) of a 12 Kv three phase distribution system. The power lines were located directly above the well shack and were approximately 27 feet above ground level.

A neighbor noticed a brush fire soon after the incident occurred, and summoned the fire department at 10:05 a.m. Fire department personnel arrived at the scene at 10:18 a.m. and discovered the two victims. Fire department paramedics could not detect pulse or spontaneous respirations in either victim. Both victims had electrical burns on their feet and arms. Victim #1 was located at the rear (east) end of the truck. Victim #2 was found approximately 7 feet from the truck and also on its east side.

CAUSE OF DEATH

The Coroner's Autopsy Report stated the cause of death for both victims to be electrocution.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should conduct initial jobsite surveys to identify hazards associated with each jobsite and develop job-specific methods of controlling these hazards.

Discussion: Employers should conduct jobsite surveys to identify potential worker hazards so that appropriate preventive measures to control these hazards can be applied prior to the start of any work. Two characteristics of this jobsite combined to produce a serious hazard: 1) a three phase 12 Kv electrical distribution system which was located approximately 27 feet off the ground, and 2) the use of a conductive truck-mounted boom in the vicinity of the power lines. Such potential hazards can be minimized by ensuring that employees maintain a safe distance from energized conductors, by providing employees with non-conductive tools and materials, and/or by de-energizing or covering electrical conductors with insulating material. Under Title 8 of the California Code of Regulations (CCRs) section 3203 (a) (4): "Every employer shall establish, implement, and maintain an effective Injury and Illness Prevention Program. The Program shall be in writing and shall at a minimum include procedures for identifying and evaluating workplace hazards, including scheduled and periodic inspections to identify unsafe conditions and work practices."

Recommendation #2: Employers should always contact the local power company when working in close proximity to energized high voltage power lines.

Discussion: The employer did not contact the power company prior to beginning work, specifically preparing to hoist a water pump from the bottom of a 400 ft. water well. Under Title 8 of the California Code of Regulations, section 2948, "When any operations are to be performed, tools or materials handled, or equipment is to be moved or operated within the specified clearances of any energized high-voltage lines, the person or persons responsible for the work to be done shall promptly notify the operator of the high-voltage line of the work to be performed and shall be responsible for the completion of the safety measures as required by section 2946 (b) before proceeding with any work which would impair the aforesaid clearance."

The local power company, if contacted, could have dispatched a line crew to either protect or de-energize the high voltage power lines. Had the power company performed this service, the fatalities in this incident would most likely have not occurred.

Recommendation #3: Employers should train employees in the recognition of hazards, and methods to control such hazards.
Discussion: Employers should provide employees with adequate training to ensure that they can recognize potential hazardous exposures. When new company procedures or guidelines are developed or existing ones modified, employers should ensure that workers are provided with appropriate supplemental training. If these workders had received additional training in the recognition of electrical hazards, they may have taken appropriate steps to prevent contact with energized high-voltage lines.

Recommendation #4: Employers should assure the "10-foot" rule is observed when working in close proximity to energized high voltage power lines.
Discussion: When working near energized, overhead high-voltage power lines rated 50,000 volts (50 Kv) or below, any part of the crane or its load must maintain a distance of at least 10 feet at all times. Title 8 of the CCRs, section 2946 (b) (2) states: "The operation, erection, handling, or transportation of tools, machinery, materials, structures, scaffolds, or the moving of any house or other building, or any other activity where any parts of the above or any part of an employee's body will come closer than the minimum clearances from energized overhead lines as set forth in Table 1 shall be prohibited. Operation of boom-type equipment shall conform to the minimum clearances set forth in Table 2 ..." Since the voltage involved in this incident was 12,000 and boom-type equipment was being used, Table 2 applies. Table 2 specifies that a distance of 10 feet must be maintained when exposed to voltages between 600 and 50,000. An observer, qualified to give signals, should have been watching the lifting and positioning operation to ensure the truck-mounted crane operator that he was maintaining the specified 10-foot distance. Had an observer done this, and a distance of 10-feet from the energized, overhead power lines was maintained at all times, this incident would most likely not have happened.

References
Barclays Official Code of Regulations, Vol. 9, Title 8, Industrial Relations. South San Francisco, CA, 1990.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, state-based FACE programs include: Alaska, California, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New York, Oklahoma, Oregon, Washington, West Virginia, and Wisconsin.

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Additional information regarding the CA/FACE program is available from:

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